UNIVERSITI SAINS MALAYSIA

2nd. Semester Examination
2002/2003 Academic Session

February / March 2003

EAP 412/3 –

Duration : 3 hours

Instructions to candidates:

1. Ensure that this paper contains **SEVEN (7)** printed pages include appendices.

2. This paper contains **SEVEN (7)** questions. Answer **FIVE (5)** questions only. Marks will be given to the **FIRST FIVE (5)** questions put in order on the answer script and **NOT** the **BEST FIVE (5)**.

3. All questions carry the equal marks.

4. All questions **MUST BE** answered in Bahasa Malaysia.

5. Write answered question numbers on the cover sheet of the answer script.

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1. (a) With the help of an example and a sketch, explain how sound wave is generated.

(5 marks)

(b) Give the difference between Sound Pressure Level and Sound Power Level.

(5 marks)

(c) Summed the Sound Power Level and the Sound Pressure Level from the following field data, 100 dB, 75 dB and 64 dB using formula.

(5 marks)

(d) A concrete wall is having a transmission coefficient, $\tau=3.0x10^{-2}$. Another wall (mortar) is having a transmission coefficient, $\tau=2.5x10^{-5}$. Calculate the noise reduction in dB for both walls.

(6 marks)

2. (a) In brief, explain the meaning of Noise level (Phone).

(5 marks)

(b) Calculate the values of Leq, L_{10} and L_{90} for the following monitoring data:

(10 marks)

Duration (Minutes)	**Sound level dB (A)**
10	71
20	75
30	70
40	78
50	80
60	84
70	60
80	66
90	67
100	70
110	65
120	67

(c) Describe **FIVE (5)** methods that normally applied in controlling noise emission from construction activities.

(5 marks)

3. (a) A factory emitted air pollutant at 500g/s from its stack. The effective height of the stack is 120 m. On that day, the sun was shining brightly and the wind speed was 4 m/s.

i. Estimate the maximum concentration of the pollutant in the wind direction,
ii. Estimate the concentration of the pollutant if crosswind took place 50m from a downwards distance of 500m from the stack.

(8 marks)

(b) With the help of relevent figures, explain the distribution of plume for the following:

i. Looping
ii. Lofting
iii. Fumigation

(9 marks)

(c) The concentration of carbon monoxide at a junction was found to be 60 ppm. At the same time workers from the Department of Irrigation and Drainage, were repairing a leakage in the piping system. Estimate the concentration of carbon monoxide in their blood if they were working hard for 1 hour and 15 minutes.

4. (a) Determine the collection efficiency for a cyclone if the design criteria and data are as follows:

average diameter size = 7.5 μm

gas fow, v_i = 15 m/s

ρ_p , density of particulate = 1.7 g/cm^3

Effective number of turns, N_e =12 cm

Gas viscosity, μ = 0.748 kg/m.hr

(8 marks)

(b) Explain briefly **ONE(1)** method to control air particulate and another **ONE (1)** method to control a named gas.

(6 marks)

(c) Explain **THREE (3)** laws/ legislations available in Malaysia to control air pollution.

(6 marks)

5. (a) A slaughter house has to install a wastewater treatment plant.

i. What would be the expected characteristics of the wastewater?

(4 marks)

ii. Suggest a possible flow diagram for the treatment of the wastewater.

(6 marks)

(b) The following results were obtained from a survey of the wastewater discharge from a factory:

Time	Flow, l/s
8 am – 12 noon	70
12 noon – 4 pm	100
4 pm – 8 pm	40
8 pm – 12 midnight	100
12 midnight – 4 am	130
4 am – 8 am	60

Determine:

i. The in-line storage volume required for an equalization tank so that a constant outflow from it can be maintained.

(8 marks)

ii. The hydraulic retention time of the tank at the average flow.

(2 marks)

6. (a) Describe any **TWO (2)** of the following in the context of waste treatment:

i. Composting
ii. Pyrolysis
iii. Equalisation tank
iv. Floatation

(10 marks)

The following table shows the results of a column analysis that was used to determine the settling characteristics of an activated sludge suspension.

MLSS Concentration, mg/l	1000	2000	3000	4000	5000	6000
Settling velocity, m/h	3.5	1.6	0.6	0.3	0.1	0.05

If the influent to the secondary clarifier is 4000 m^3/d with an MLSS concentration of 3000 mg/l, determine the diameter of the clarifier if the sludge is to be thickened to a concentration of 8000 mg/l.

(10 marks)